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Requirements for Good Aquaculture Practices — India GAqP CARPS

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भारतीय मानक ब्यूरो
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Fish, Fisheries and Aquaculture Sectional Committee, FAD 12

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Fish, Fisheries and Aquaculture Sectional Committee, had been approved by the Food and Agriculture Division Council.

Considerable milestones have been reached in productivity of aquaculture products in the country. Concerns about food safety and quality, sustainability, environmental protection, worker safety and welfare have also gained importance. Thus, it is desirable to set up control and compliance systems for various kinds of aquaculture produce. In this context, it is necessary to pay attention to the quality of production practices requiring minute attention at different aspects of production, storage, handling and distribution.

In India, aquaculture practices are highly localized occupations and display a lot of variability in cultural practices and varietal preferences across regions. Further, with the opening up of the world market, there is a flow of trade in the aquaculture products. It is, therefore, necessary to define and assign certain common minimum standards to facilitate trade in these products and to win the confidence of the consumers within the country and outside.

Such standards envisaging focused approach for implementing good aquaculture practices, traceability etc. through appropriate infrastructure, record keeping and monitoring would reap following broad benefits:

a) Development of basic infrastructure at the field level,
b) Build up culture for good aquaculture practices by the farmers,
c) Uniform approach across farms regardless of their sizes,
d) Increased awareness among the producers as well as the consumers about the need for consumption of good quality and safe food,
e) Traceability through complete integration of food chain,
f) Improvement in the environment,
g) Worker safety and welfare,
h) Reputation in the international market as a producer of good quality and safe produce, and
j) Overcoming the Technical Barriers to Trade (TBTs).

This Standard is part of a series of Indian Standards on Good Aquaculture Practices under development.

The composition of the Committee, responsible for the formulation of this standard is given at Annex A.

In formulation of this standard, considerable assistance has been provided by Indian Council of Agricultural Research - Central Institute of Freshwater Aquaculture, Bhubaneswar (ICAR-CIFA). Contribution of Dr. P. C. Das, Principal Scientist, (ICAR-CIFA) is also duly acknowledged.

Indian Standard

REQUIREMENTS FOR GOOD AQUACULTURE PRACTICES — INDIA GAqP CARPS

1 SCOPE

This Indian Standard covers the control points and compliance criteria necessary to be followed by the producers (individual producers and/or members of a producer group) of freshwater carps. This standard applies to the good aquaculture practices (GAqP) to be followed at all stages of the production of carps in freshwater pond including practices followed for stocking, pond management, harvesting and post-harvest handlings prior to transportation to market.

2 TERMINOLOGY

For the purpose of this standard, the following terminologies shall apply:

2.1 Good Aquaculture Practices — Practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food aquaculture products.

2.2 Applicant Producer/Producer Group — Individual/organization that has applied for certification to India GAqP certification body.

2.3 Hazard — A biological, chemical and physical agent in/or condition of which have the potential to cause an adverse health effect.

2.4 Individual Producer — A person/organization legally responsible for on farm production, who retains ownership of all the produce covered in the India GAqP licence.

2.5 Inspection — An examination of all aquaculture practices in order to verify compliance to requirements specified in this standard.

2.6 Record — Document showing objective evidence of the tasks performed and results achieved.

2.7 Self-inspection — Internal inspection of the registered product carried out by the grower on his/her farm using control points and compliance criteria.

2.8 Traceability — The ability to trace the history, use or location of a product (that is, the origin of materials and parts, processes applied to the product, or its distribution and placement after delivery) by means of a record.

2.9 Worker — Any person on the farm who has been contracted to carry out a task. This includes farm owners and managers.

2.10 Producer Group — A recognized group of producers applying for certification with an internal procedure and internal control of all the members registered to the India GAqP requirements, and complying the requirements as specified in this standard.

2.11 Field — Separate unit of land within a farm.

2.12 Farm — A farm is an agricultural production unit or roup of agricultural production units, covered by same operational procedures, farm management.-

2.13 Environment — Surroundings in which an activity takes place including air, water, land, natural resources, flora, fauna, humans, and their interrelation.

2.14 Customer — A customer is anyone who purchases products or services from a supplier.

2.15 Certification — All actions leading to the issuance of an India GAqP licence.

2.16 Standard Operating Procedure — A written document which details an operation, analysis, or action whose mechanisms are prescribed thoroughly and which is commonly accepted as the method for performing certain routine or repetitive tasks.

2.17 Major Requirement — The mandatory requirement that shall be fully complied with. In case of non-compliance, it will seriously affect the quality of freshwater aquatic animal as well as safety for consumers. It means that the requirement shall be complied with relevant laws and regulations as well.

2.18 Minor Requirement — The requirement that shall be mostly complied with. In case of non-compliance, it will affect the health of freshwater aquatic animal or product quality.

2.19 Veterinary Drug — Any substance applied or administered to any food-producing animal, whether used for therapeutic, prophylactic, or diagnostic purposes or for modification of physiological functions or behaviour.

3 CONTROL POINTS AND COMPLIANCE CRITERIA

3.1 Control points and compliance criteria required to be followed by the applicant producer (individual producer and/or member of a producer group) as well as by the certification body for independent verification of the aquaculture practices that have gone into the production of the produce are given in Table 1. In addition, the applicant producer (individual producer and/or member of a producer group) shall demonstrate compliance with all applicable statutory and regulatory requirements.

3.2 These criteria are marked as 'Major' or 'Minor' or 'Reco'. The criteria marked as 'Major' have a definite effect on the safety and quality of the produce and shall, therefore, be complied with, or shall give adequate assurance about the safety and quality of the produce. The criteria marked as 'Minor', though have a bearing on quality, and are those which, if implemented, would provide an advantage to the assessment for India GAqP certification. The criteria marked as 'Reco', are those, which though may not have direct bearing on safety and quality of produce but may have other benefits to the producer and are recommended for implementation and are advisory in nature.

3.3 For the purpose of verification, a grading pattern given below shall be followed for grant of India GAqP licence:

Category of Licence	*Compliance of Major Requirements* (in Percent)	*Compliance of Minor Requirements* (in Percent)
India GAqP — A	100	90
India GAqP — B	100	80
India GAqP — C	100	75

4 BIS INDIA GAQP CERTIFICATION

BIS India GAqP certification shall be as prescribed under the provisions of *Bureau of Indian Standards Act,* 2016 and Rules and Regulations framed thereunder. The details of the conditions under which the licence may be granted to producer (individual producer and/ or member of a producer group) may be obtained from the Bureau of Indian Standards.

Table 1 Control Points and Compliance Criteria

(*Clause* 3.1)

Sl No.	**Item**	**Level**	**Requirements**	**Compliance Criteria**
1	**LOCATION AND LAYOUT OF FISH FARM, SITE RECORD AND TRACEABILITY**			
1.1	Identification and traceability	Major	India GAqP registered produce shall be traceable back to the registered farm where it has been grown	a) Verify that the registered grower, society, farm and produce has been given a Code No. and a package of practice to be followed for accurate trace-back of the produce. b) Verify that the farm has a documented identification and traceability system that allows India GAqP registered product to be traced back to the farm; or, in a farmer group, to the registered farms c) Harvest information shall link a batch to the production records of the farms. Produce handling shall also be covered, if applicable. NOTE — The first traceability starts with the registration/identification number given to the farm. Next traceability is plot and batch identification.
1.2	Farm location	Minor	Survey No./Part-Survey No., village, tehsil, district, state where the farm is located, total area under cultivation and area under India GAqP certification shall be specified	Verify the location of the farm is complying to the records
1.3	Farm layout	Minor	Fields/plots and structures shall be identified on layout map of the farm	Verify that ponds and other infrastructures are in place as per the layout of the farm
		Minor	Availability of good water supply, inlet and outlet system	Visual inspection of the design of water inlet and outlet system and water supply and drainage system among the ponds to prevent cross contamination

Table 1 (*Continued*)

Sl No.	Item	Level	Requirements	Compliance Criteria
1.4	Vicinity of production area to potential risk source	Minor	Vicinity of farm with reference to chemical or other industries, saline regime, agriculture fields, rivers, other water sources, hill rocks, and reclaimed land shall be specified	a) Find out the micro-climate of the area that affects the productivity, safety and quality of the aquaculture product b) Verify measures taken to minimize contamination
1.5	Access to the farm	Minor	Convenient access to the farm from both outside and inside for easy farm operation and transportation of the inputs and produce	Visual inspection
2	**SOIL AND WATER MANAGEMENT**			
2.1	Soil Mapping	Minor	Land should be classified based on topography, texture and structure of soil, gradient, surroundings, etc. Soil maps should be prepared for the farm.	a) Verify that class of land has been decided based on prevailing land capability classification systems of the appropriate authority. b) Verify that the type of soil is identified for each site based on a soil profile or soil analysis or local (regional) cartographic soil type map c) Verify that the analysis is carried out for the soil from actual depth of interest for farming the targeted species.
2.2	Soil Health	Minor	Soil health shall be determined based on physical and chemical composition and soil profiling	Verify that the soil is ideally suited for the species, based on soil reaction (Electrical conductivity, pH), soil nutrient status, etc. Refer soil analysis reports.
2.3	Water source	Major	Water source can be surface water or ground water, and the source need to be identified	a) Verify that the water from source is free from any pollutants (pesticides, heavy metals). b) Verify that the water supply and drainage are two separate system in the farm to avoid cross contamination
2.4	Water quality	Major	Water quality shall be determined based on standard chemical analysis	Verify that the water quality is suitable or is being monitored to provide ideal growing environment for the proposed carp species
2.5	Waste water drainage	Major	Effluent disposal should Comply with relevant laws and regulations	a) Verify that the effluent water is treated through treatment plant before release to the environment b) Verify the quality of treated water before disposal
3	**GROWER RECORD**			
3.1	Type of farming	Reco	Records relevant for the type of farming (co-operative, contract, lease farming, individual farmer, group farming/ public/ Governmental agencies) should be maintained	Verify the type of aquaculture activities and relevant records
3.2	Farm management capability	Reco	Grower's accomplish-ment in farming, technical back ground in aquaculture, skills acquired and knowledge support available shall be documented.	a) Verify that farmer or the farm manager is well versed in aquaculture through formal education, skill development training or experience b) Verify, if the farmer is getting technical know-how from Government or any other competent organization or individuals

Table 1 (*Continued*)

Sl No.	Item	Level	Requirements	Compliance Criteria
3.3	Maintenance of records	Minor	Records on types of culture system, cultivated species, stocking density, cropping pattern shall be maintained	a) Verify that records are maintained for the species cultured in the particular system for the current and previous growing seasons and for a minimum period of six months for new applicants. b) Verify that records are maintained for the cropping pattern of particular farms and crop history of particular plots
3.4	Retention period of records	Reco	All records requested during the inspection shall be accessible and shall be kept for a minimum period of two years	Verify that the producers keep up to date records for a minimum of two years from the date of previous inspection
3.5	Internal evaluation	Minor	The farmer/society/co-operative body shall undertake internal self-inspection on scheduling of crop production practices and shall exercise necessary supervision in their adoption	Verify that self-evaluation based on applicable criteria is conducted annually or seasonally during crop duration
3.6	Corrective Actions	Major	Effective corrective actions shall be taken as a result of internal self-inspections.	Verify, validate, implement and check documentation of all corrective actions
4	**CULTURE SPECIES & SYSTEM**			
4.1	Culture System	Reco	The culture system needs to be specified	a) Verify that the culture system is specified b) Verify that the practitioner has basic knowledge and acquired skill to operate in the culture system
4.2	Species Selection	Major	Culture species need to be selected based on market demand as well as the soil and water quality of the site and climatic condition prevailing in the area	Verify that species selected is suitable for the site and has good demand in the market.
4.3	Culture practice	Major	Culture practice to be followed need to be recorded	Verify that the practitioner is trained/acquired knowledge and skill on the culture practice
4.4	Cropping pattern	Reco	Cropping pattern recommended by State Agriculture Universities (SAUs)/National Research Institutes/ other Govt. Organizations/Govt. approved organizations shall be used	Verify that the cropping pattern recommended by State Agriculture Universities (SAUs)/ National Research Institutes/other Government organizations/ Government approved organizations shall be used
5	**SEEDS**			
5.1	Traceability of Seeds	Major	Seed procured from a reputed/ certified hatchery shall be used	Verify that the seed used is procured from a reputed/certified hatchery and record is maintained on the procurement date and batch of seed production
5.2	Quality of Seeds	Major	The seeds shall be active and apparently healthy, free from known major diseases of the cultivated species.	a) Verify claim on seed, regarding size and freedom from known diseases endemic to the area. b) Verify that necessary documentation is maintained on verification of the claim
5.3	Seed transport	Reco	Seed should be transported in hygienic conditions and with minimum stress. Standard protocol for seed transportation should be followed.	Verify that the seed has been transported in hygienic conditions and with minimum stress to the animals
6	**NURSERY & REARING**			
6.1	Pond Preparation	Major	The standard /recommended pond preparation practices shall be followed. The source of technology shall be documented.	Verify that source of technology is documented Verify the records that standard/recommended practices have been followed during pond preparation

Table 1 (*Continued*)

Sl No.	Item	Level	Requirements	Compliance Criteria
6.2	Stocking attributes	Minor	Stocking size should be spawn (4-7 mm) and fry (20-30 mm) for the nursery and rearing phases, respectively, depending on the species and stocking density need to comply to recommendation of the source technology	Verify from the records that appropriate seed only are stocked and stocking density is as per recommendation of the source technology to achieve the desired final size in pre-define culture duration
6.3	Pond Environment Management	Major	The standard pond management practices for maintaining optimum water quality (phased manuring, addition/exchange of water and aeration) need to be followed as per the demand of the species and system.	Verify from the records that the standard pond management protocol for maintaining water quality and pond environment are followed
6.4	Types of feed	Minor	Feed for the targeted species should be selected as per the production protocol. Feed should comply to recommended nutritional profile and should be farm-made or sourced from a reputed company	Verify that the nutritional value, forms of feed (sinking/semi-floating/ floating) and diameter of feed pellet suit the feeding behaviour and proper nutrition of the species
6.5	Daily feeding	Minor	Feeding to be done as per species behavior and actual requirement	Verify from the record if the daily ration is provided as per recommendation of source technology to avoid wastage of feed and curtail pollution of the pond environment
6.6	Health Management	Major	Routine health checkup of the stocked fish need to be conducted once in three weeks by cast net sampling. If any fishes are found to be affected by any diseases or external parasitic infestation then immediate corrective actions should be taken.	Verify from the records that routine health checkup has been conducted and immediate corrective action has been taken whenever any abnormality noticed.
6.7	Harvesting	Minor	The harvesting should be well planned to reduce the stress during harvest and subsequent mortality during transportation	Verify from the records that harvesting was well planned and carried out in an organized manner.
6.8	Seed packing and transportation	Minor	Seed should be packed in proper container bag filled with clear water and oxygen and packing density should comply to seed size and distance/time of transportation	Verify from the record that seed packaging and transportation are being made as per prescribed protocol
7	**GROW-OUT CULTURE PRACTICES**			
7.1	Pre-stocking pond preparation			
7.1.1	Pond preparation in acid-Sulphate soil region	Major	Soil reclaimation to be done to bring water *p*H to desirable level through 2 to 3 cycles of water filling-liming-draining of the pond	Verify that the *p*H of soil and water is being maintained within suitable ranges of the cultured species
7.1.2	Preparation of dry and seasonal pond	Major	Pond preparation to be done following suitable protocol of liming and application of organic manure	Verify that pond preparation carried out with appropriate dosages of organic manures and lime. Verify from record if any unscrupulous chemicals having long retention period and ill effect on the food chain are used during pond preparation
7.1.3	Preparation of perennial pond	Major	Pond preparation to be done following suitable protocol of weed clearance, liming, application of organic manure	Verify that pond preparation carried out with prescribed use of lime, manures and chemical fertilisers as per the source technology. Verify that unscrupulous chemicals having long retention period and ill effect on the food chain are not used during pond preparation
7.2	Stocking			

Table 1 (*Continued*)

Sl No.	Item	Level	Requirements	Compliance Criteria
7.2.1	Stocking Size	Minor	Stocking size should not be less than fingerling or juveniles depending on the species, duration of culture and targeted production	Verify from the records that fingerling or juveniles are only stocked to achieve the desired final size in pre-defined culture duration
7.2.2	Acclimatization	Minor	Seed to be acclimatized to the new pond condition prior to release	Verify that proper seed acclimatization done prior to release to ensure higher survivability.
7.2.3	Density and species ratio	Minor	Stocking density and species ration need to comply to recommendation of source technology	a) Verify that stocking density complies to the targeted production b) Verify that suitable species ratio maintained for effective utilisation of pond productivity and living space
7.3	Post-Stocking Pond Management			
7.3.1	Manuring and fertilization	Minor	Pond productivity should be maintained with interim application of lime, manures and fertilisers. Manuring must be stopped 15 days before harvest.	a) Verify from record that only recommended lime, fertilisers and organic manures are used for interim application and in prescribed dosage to maintain the natural productivity (plankton production b) Verify that manures and fertilisers applied as and when required in right dosage to avoid wastage and the deterioration of water quality
7.3.2	Supplementary feed and Feeding	Minor	Type of feed is selected based on feeding behavior and nutritional requirement of the cultured species. Feed should be farm-made or sourced from a reputed company	a) Verify the nutritional claim of the feed b) Verify that the forms (sinking/semi-floating and floating) and size of the feed pellet suits the feeding behaviour c) Verify from record that daily feed ration is tailored to meet the actual requirement of feed to minimize wastage of feed and pollution
7.3.3	Pond environment monitoring and management	Minor	Pond environment management is done following suitable protocols of liming, manuring, fertilization	a) Verify that record is maintained on water quality parameters and corrective measures taken to maintain the water quality within tolerance range of the cultured species b) Verify that pond environment management is done with appropriate protocol of interim liming, manuring and fertilization as per the source technology c) Verify if record of water transparency and plankton density is being maintained to give idea if natural food (plankton) available adequately in the pond
7.3.4	Health management	Minor	Periodic sampling of fishes for health check Management measure shall be considered prior to application of any therapeutics/ veterinary drugs/ chemicals in case of any abnormal symptom. Corrective measures should be taken up after preliminary diagnosis	a) Check the daily record of farming activity and verify from record on any disease incidence b) Check if the abnormal condition can be normalized through management measures c) Verify that effective preventive and prophylactic measures taken in case of any disease incidence. d) Verify that un-scrupulous chemicals are not used to cure or curtail the disease incidence.
7.3.5	Reporting of disease outbreak	Major	In case of disease outbreak, farmer shall immediately inform the nodal department	a) Verify the record of water quality and feeding schedule b) Verify for any earlier similar disease incidence and corrective measures taken thereafter and the fate of the measures to cure the disease

Table 1 (*Continued*)

Sl No.	Item	Level	Requirements	Compliance Criteria
7.3.6	Use of veterinary drugs and chemicals	Major	Use only permitted veterinary drugs and chemicals.	a) Verify the application record of veterinary drugs and chemical undertaken as corrective measures of the disease incidence. b) Verify the record of carcass characteristics and effluent water.
7.3.7	Harvesting	Minor	The harvesting should be well planned to reduce the stress during harvest and subsequent deterioration of product quality.	Verify from the records that harvesting was well planned and carried out in an organized manner.
8	**POST-HARVEST MANAGEMENT**			
8.1	Live transport	Reco	Transport harvested fish in live condition to main freshness of the product	a) Verify that live fishes are transported in suitable container b) Verify that chemicals having adverse effect on fish and pond productivity is avoided
8.2	Cold Chain Transport			
8.2.1	Sorting and Grading	Reco	Harvested fishes are to be graded as per sizes.	Verify that harvested fishes are graded before sale to fetch size specific sale price.
8.2.2	Packing	Reco	Packing is done to maintain product quality	a) Verify that the harvested fishes are properly packed to ensure better quality b) Verify that packing is done with approved packaging materials.
8.2.3	Transport	Reco	Harvested fish to be transported to the market	a) Verify that appropriate fish : ice ratio maintained in pack based on transport distance and duration to maintain product quality during short and long-term transportation in cold chain b) Verify that no unscrupulous chemicals/ anti-biotic used during the packaging to extend the keeping quality
8.2.4	Product Withdrawal and Recall	Major	Procedures for product withdrawal	a) Verify that each product batch is given a number for tracing back in case of withdrawal b) Verify that a procedure for withdrawing the product consignment is available. c) Verify from record and interview with the workers regarding any history of product withdrawal in the farm
9	**BUILDING, EQUIPMENT AND OTHER INFRASTRUCTURE**			
9.1	Storage facility for feed, feed ingredients, lime, fertilizers and other inputs	Minor	Farm should have well ventilated storage facility for feed to maintain the feed quality during storage. Farm should have suitable provision to keep other inputs in good condition	a) Visual inspection to verify that the store is clean, well ventilated and protected from moisture and has provision to store feed bags in stacks b) Verify that the store is free from rodents. c) Verify that the limes and other chemicals and fertilizers are of fresh stocks and are being stored properly
9.2	Store facility for farm implements	Reco	All farm implement should be orderly placed hygienically in store	Visual inspection
9.3	Maintenance/ calibration protocol	Minor	Maintenance schedule/Plan of farm machinery	a) Verify that the farm implements are maintained properly b) Verify the record that all measuring implements such as balance, gadgets for water quality monitoring, etc. are calibrated periodically as per requirement

Table 1 (*Concluded*)

Sl No.	Item	Level	Requirements	Compliance Criteria
9.4	Office building	Reco	Well-equipped office and laboratory	a) verify the farm has a good laboratory for soil and water quality management b) Visual observation of the office room for facility like discussion table and other accessories inside for record keeping and sitting
10	**HYGIENE IN FARM**			
10.1	Discharge water from pond	Major	Treatment of discharge water in effluent treatment system (ETS) before release to environment	Verify that the farm should have a well-designed ETS to treat the discharge water before it release and this water should not contaminate the source water
10.2	No discharge of domestic waste or animal house waste	Major	Farm should be free from receiving any household waste or waste and wash water from animal shed	Visual inspection
10.3	Toilet in farm	Major	Hygienically designed toilet should be located at safe distance from the pond	Verify the location of the toilet and its storage chamber to be at safe distance to prevent possible sewage contamination
11	**PERSONAL HYGIENE AND WELFARE**			
11.1	Personnel Hygiene	Minor	All workers should be free from any contagious disease. This should be ensured through periodic health screening of workers.	Verify the records of medical examination and health screening of workers
11.2	Sanitary facilities	Minor	Avoidance of contamination from human source	Verify that proper facilities (hand washing, clean clothing, clean toilet) are available for the workers in the farm
11.3	Visitors	Reco	Only authorized access only in certain area after proper sanitary measures	Verify the facility that is used (clean clothing, using chlorinated water for washing feet, etc.) to avoid contamination from the visitor, especially in the hatchery system
11.4	Amenities	Reco	Designated and well maintained areas scaled as per the number of farm workers for sitting and dining	Visual Inspection
12	**TRAINING TO FARM PERSONNEL**			
12.1	Training Requirements	Reco	Assessment of training requirement for the personnel for fish farming and handling of farm implements	a) Verify from record that personnel have basic training on farming b) Verify that the personnel have been given refresher course periodically on the recent techniques of carp farming and post-harvest handling
13	**RECORD KEEPING**			
13.1	Maintenance of record	Minor	All the major activities of the farm, records of employee, culture operation, input use, disease incidence, fish growth, harvest and sale records should be maintained	Verify that all these records are maintained

BIBLIOGRAPHY

1. Jena, J.K. and Das, P.C., 2011. Carp culture, in: Verma, S.A., Kumar, A.T., Rahman, O., radhan, S. (Eds.), Hand Book of Fisheries and Aquaculture. pp 1116 (Second Revised Edition). Directorate of Knowledge Management in Agriculture (DKMA), Indian Council of Agricultural Research, New Delhi, p. 380-400.
2. Jena, J.K., Das, P.C., Das, B.K., Mohapatra, B.C., Sarangi, N., Modayil, M.J., Vass, K.K., Ravichandran, P., Ponniah, A.G., Syda Rao, G., Eknath, A.E. and Ayyappan, S., 2009. Aquaculture Technologies for Farmers. Revised Edition, ICAR, New Delhi. pp. 126.
3. Sahoo, P.K., Mohanty, J., Das, P.C., Mohanta, K.N., Barik, N.K., Jayasankar, P., 2012. *CIFA: 25 Year of Freshwater Aquaculture Research*, CIFA, Bhubaneswar. pp 196.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Fish, Fisheries and Aquaculture Sectional Committee, FAD 12

Organization	*Representative(s)*
Indian Council of Agricultural Research, New Delhi	Dr Joykrushna Jena, (***Chairperson***)
Central Inland Fisheries Research Institute, Barrackpore	Dr Bijay Kumar Behera Shri Dharmendra Kumar Meena (*Alternate*)
Central Institute of Brackish Water Aquaculture, Chennai	Dr K. Ambasankar Dr Subhendu Kumar Otta (*Alternate*)
Central Institute of Fisheries Education, Mumbai	Dr Gopal Krishna Dr B. B. Nayak (*Alternate*)
Central Institute of Fisheries Technology (CIFT), Cochin	Dr K. Ashok Kumar Dr Madhusudana Rao (*Alternate*)
Central Institute of Fresh Water Aquaculture, Bhubaneswar	Dr Kedar Nath Mohanta Dr P. C. Das (*Alternate*)
Central Marine Fisheries Research Institute, Kochi	Dr A. K. Abdul Nazar
Coastal Aquaculture Authority, Chennai	Prof R. Jayaraman Shri S. Mani (*Alternate*)
Defence Food Research Laboratory, Mysore	Dr N. Gopalan
Export Inspection Council of India, New Delhi	Shri R. M. Mandalik
Fisheries Division, DAHD&F, Min. of Agriculture, GoI, New Delhi	Shri Paul Pandian Shri I. A. Siddiqui (*Alternate*)
Food Safety and Standards Authority of India, New Delhi	Ms Vinita Verma Dr Rajesh Kumar (*Alternate*)
National Fisheries Development Board, Hyderabad	Executive Director (Technical)
National Institute of Fisheries Post Harvest Technology and Training (NIFPHATT), Cochin	Shri Varghese John Mr Kamal Raj (*Alternate*)
Sea Food Exporters Association of India, Alleppy	Shri Norbert Karikkassery
Society of Aquaculture Professionals, Chennai	President
The Marine Products Export Development Authority (MPEDA), Kochi	Joint Director Deputy Director (QC) (*Alternate*)
Kerala University of Fisheries and Ocean Studies, Kochi	Dr T. V. Sankar
All India Shrimp Hatchery Association	Shri D. Ramraj Shri K. Madhusudan Reddy (*Alternate*)
Director General, BIS (*Ex-officio Member*)	Shri P. Rajesh, Head (Food and Agriculture Department)

Member Secretary

Ms Navita Yadav

Scientist 'C' (Food and Agriculture Department), BIS

Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg CHANDIGARH 160019	265 0206 265 0290
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